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VIA ELECTRONIC MAIL ONLY

Subject: Upper Columbia River Remedial Investigation and Feasibility Study (UCR RI/FS) –
Benthic Macroinvertebrate Tissue Study Sample Compositing Plan

Dear Dr. Buelow:

The final EPA-approved BMI study QAPP Addendum specified that Teck American Incorporated (TAI) would develop the specific compositing plan for crayfish and mussels in consultation with EPA. TAI worked diligently with EPA over the course of several months to do just that. Specifically, the draft BMI compositing plan submitted for EPA's review on October 27, 2016 was developed based on EPA's interim compositing plan dated July 22, 2016.

EPA has changed course on the compositing approach, as reflected in its technical memorandum dated December 21, 2016. TAI responded with our technical concerns about EPA's new approach in our memorandum dated January 21, 2017. We received EPA's response to that memorandum dated January 26, 2017. Notwithstanding EPA's January 26, 2017 response, we continue to have concerns that EPA's new approach will compromise the study DQOs and unnecessarily increase uncertainty in EPC estimates. The purpose of this response is to reply to EPA's January 26, 2017 response, document our ongoing concerns, and urge that EPA re-consider these concerns.

Issue 1: EPA incorrectly states that the October 27, 2016 compositing approach, which reflected TAI's consultation with EPA, deviates from the QAPP.

EPA Comment, p. 1, 1st paragraph of Background Section: "TAI's proposed compositing approach deviated from the QAPP (Exponent 2016) by attaining the targeted six composites per area by using multiple field replicates instead of using samples representing six unique sampling



locations within each area. For mussels, field replicates were included in every sampling area; for crayfish, only in Area 4. The QAPP addressed the use of field replicates to evaluate variation of composite samples within an area, but they were to be used in addition to the composites created from six unique sampling locations.”

TAI Objection: EPA’s assertion that TAI’s compositing approach deviated from the QAPP is incorrect. The QAPP did not require that samples be collected from unique locations, although that was a target. As described in the field sampling plan (FSP) for mussel collection, after reconnaissance of the entire shoreline area of the site, an extensive search of 12 of the most promising different beach locations within each sampling area was conducted in an attempt to collect mussels from different areas. For crayfish, traps were placed throughout each area for a total of at least 90 trap nights in each area. As stated in the FSP regarding mussel sampling: “...ideally each composite sample will be collected from a separate beach area, although this may change depending on the availability of mussels in the sampling area.” EPA field oversight provided confirmation that the effort was sufficient per the QAPP for each area. In some areas, the target of collecting samples from six unique locations was simply not achievable due to limited occurrence of mussels, despite meeting EPA’s required level of effort.

In cases where the target of six different locations was not met, samples collected from the same beach were identified in the October 2016 compositing plan as both independent samples from the population of mussels available for people or wildlife to consume, and as samples that could be used for the purpose of evaluating variability among organisms at the same location. While these samples have been identified as “field replicates” in compositing spreadsheets, they should be considered independent samples that are representative of what is most likely to be found by consumers because of the extensive sampling effort that thoroughly covered the shoreline within each of the sampling areas. EPA has previously agreed that multiple samples could be composited from the same beach and yet not considered field replicates as stated in its July 22, 2016 interim compositing plan: “EPA would like to clarify that field replicates are not required and were only expected (potentially) as additional samples of similar tissues from the same beach. Replicates are not needed if multiple samples are already proposed from tissues collected at the same beach – in which case the samples can be used to infer variability among organisms at the same location.”

The QAPP did not specify how the samples collected within each area would be composited, but instead stated that the approach would be determined in consultation with EPA based on a number of considerations: “The specific compositing plan for crayfish (i.e., which specific samples will go into which composite) will be determined in consultation with EPA following the completion of sampling and will be determined based on the number of crayfish collected, their size (i.e., sample mass available for analysis), and locations where they were collected. The specific compositing plan for mussels will also be determined in consultation with EPA, and will be based on the number of mussels collected, the specific sampling locations (within the



sampling areas) where they were collected, and the elevations at which they were collected.”

Details of the compositing plan, particularly those related to spatial representativeness of the composites, were not specified in the QAPP beyond the general considerations mentioned in the text quoted above. Therefore, TAI’s recommended approach, developed in consultation with EPA, does not reflect a deviation from the QAPP.

In summary, we strenuously object to EPA’s assertion that the October 27, 2016 draft plan deviates from the QAPP because it is inaccurate.

Issue 2: EPA is incorrect that the mussel sample collection effort, which was overseen by EPA, was not representative.

EPA comments (pp. 3-4, Response to 1-2): *“We agree in principle that the best approach for characterizing the exposure is to “estimate the concentration that is most likely to be consumed based on what is most likely to be found.” However, we strongly caution against assuming that the specific samples collected in each area accurately represent the population of crayfish and mussels that would be found by human or wildlife consumers. This is likely less an issue for crayfish, since crayfish were broadly collected in small numbers from many locations throughout each area. For mussels, however, it is questionable how accurately the collections from only two or three locations accurately represent the area-wide population...While there could be some differences in the true size distribution in each area, it is more likely that the difference in size distribution of samples among areas is the result of sampling error and that the true size distribution of mussels in each area is more similar than suggested by the samples.”* EPA also refers to the “limited spatial representativeness” for mussels on the second page of its response memorandum.

TAI Objection: The mussel sampling effort did not result in a limited spatial representation of the population that would likely be found by human or wildlife consumers on the UCR beaches. An extensive sampling level of effort throughout each of the areas to collect mussels during two different seasons was conducted with EPA agreement and under its oversight. There is no valid reason to doubt that the organisms that were collected represent the distribution of organisms available for people or wildlife to consume. For example, beach sampling for mussels was conducted based on an on-water reconnaissance of the entire shoreline of each sampling area, followed by detailed searches conducted at 12 beaches in each area during each event. Because of this site-wide effort and the collection of every mussel that was encountered on all of the beaches surveyed, EPA’s assertion that the samples collected are not representative of the distribution of mussel populations accessible to people or wildlife along the shoreline at the time of sampling is demonstrably wrong. EPA’s current speculation that sampling error resulted in a misrepresentation of the size distribution of mussels is insupportable.



Issue 3: EPA's new, size-based compositing approach is not based on actual consumption practices and would increase uncertainty in the EPC calculations

TAI has substantial concerns that EPA's proposed compositing approach and EPC calculation methods will compromise the study DQOs. Step 2 of the DQOs states: *"Consistent with EPA's level of effort technical memorandum (USEPA 2013), the primary goal of this study is to collect data to delineate and characterize the levels of chemicals in tissues of representative mussel and crayfish taxa from the Site. The data will be used in the evaluation of potential risk to humans and aquatic-dependent, invertivorous wildlife."* This is consistent with EPA's statement in its January 26, 2017 memo that the *"composites should be created such that they provide the most information and best general characterization of potential consumption."*

EPA's proposed approach for compositing does not accomplish the goal of delineating and characterizing representative tissue concentrations that might be consumed. Rather, the size-stratified compositing scheme artificially segregates the collected tissue into arbitrary size classes, the creation of which were not informed by human or wildlife consumption practices and are highly unlikely to reflect the reality of such practices. While EPA's January 26, 2017 memo acknowledges that EPA's size-stratified compositing scheme can result in high bias, which is unacceptable in and of itself, EPA also fails to acknowledge that using size-stratified samples will increase uncertainty in the resulting EPC estimates. That is seriously problematic because the primary goal of the study – to delineate and characterize representative tissue concentrations – would be compromised.

At this late juncture after sampling is completed, EPA is introducing an unplanned study objective of exploring size-concentration relationships at the expense of the existing approved study DQOs. In contrast, the compositing approach developed by TAI in consultation with EPA is aligned with the intended use of the data as specified by the DQO process to characterize chemical concentrations in mussel and crayfish tissue consumed by humans and wildlife.

In addition, EPA's January 26, 2017 memo states that samples from the same location should be considered only as replicates and averaged, and these location means should be used to estimate the EPC. In the case of Area 1, this approach will result in significant loss of information and bias in the EPC estimate. EPA's size-based stratification compositing scheme results in mussel composites being aggregated into two discrete locations for Area 1. Following EPA's location averaging approach, the EPC for Area 1 would be the maximum of the two location means. Depending on which mean represents the maximum, samples collected and analyzed from one of the two locations (either a beach or a dive site) would not be part of the calculation of an Area 1 EPC even though they represent what was found using an aggressive reconnaissance of the entire shoreline and twelve beach surveys or a combination of underwater camera reconnaissance and diving. This means that, at a minimum, 32.5%, and potentially as much as 62.5% of the mussels collected from Area 1 would not be considered in the EPC estimate for Area 1.



The effect of using EPA's proposed approach for compositing and calculation of EPCs, rather than the approach developed by TAI in consultation with EPA, is that the area EPCs will be less robust.

We look forward to resolving these issues as soon as possible and moving forward with analysis of the samples collected during the 2016 field sampling efforts. Should you have any questions please give me a call at 509-623-4501.

Sincerely,
Teck American Incorporated

A handwritten signature in blue ink that reads "Kris R. McCaig".

Kris R. McCaig
Manager, Environment and Public Affairs

cc: Dave Enos, Teck American Incorporated
Cristy Kessel, Teck American Incorporated
Dr. John Toll, Windward Environmental LLC
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